

Linking Reusable Competency Definitions to Learning Activities: A Work in Progress

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Objectives

- **Introduce Reusable Competency Definitions (RCDs)**
- **Present an example of using RCDs as building blocks**
 - ◆ Characterize competencies by linking to existing critical task and performance measure databases
 - ◆ Define, document, and automate assessment record-keeping for certification
 - ◆ Enable automated skill gap analysis
 - ◆ Enable the automated configuration of customized courses
- **Show how RCDs can link existing task definitions to learning activities in ways that provide competency evidence**

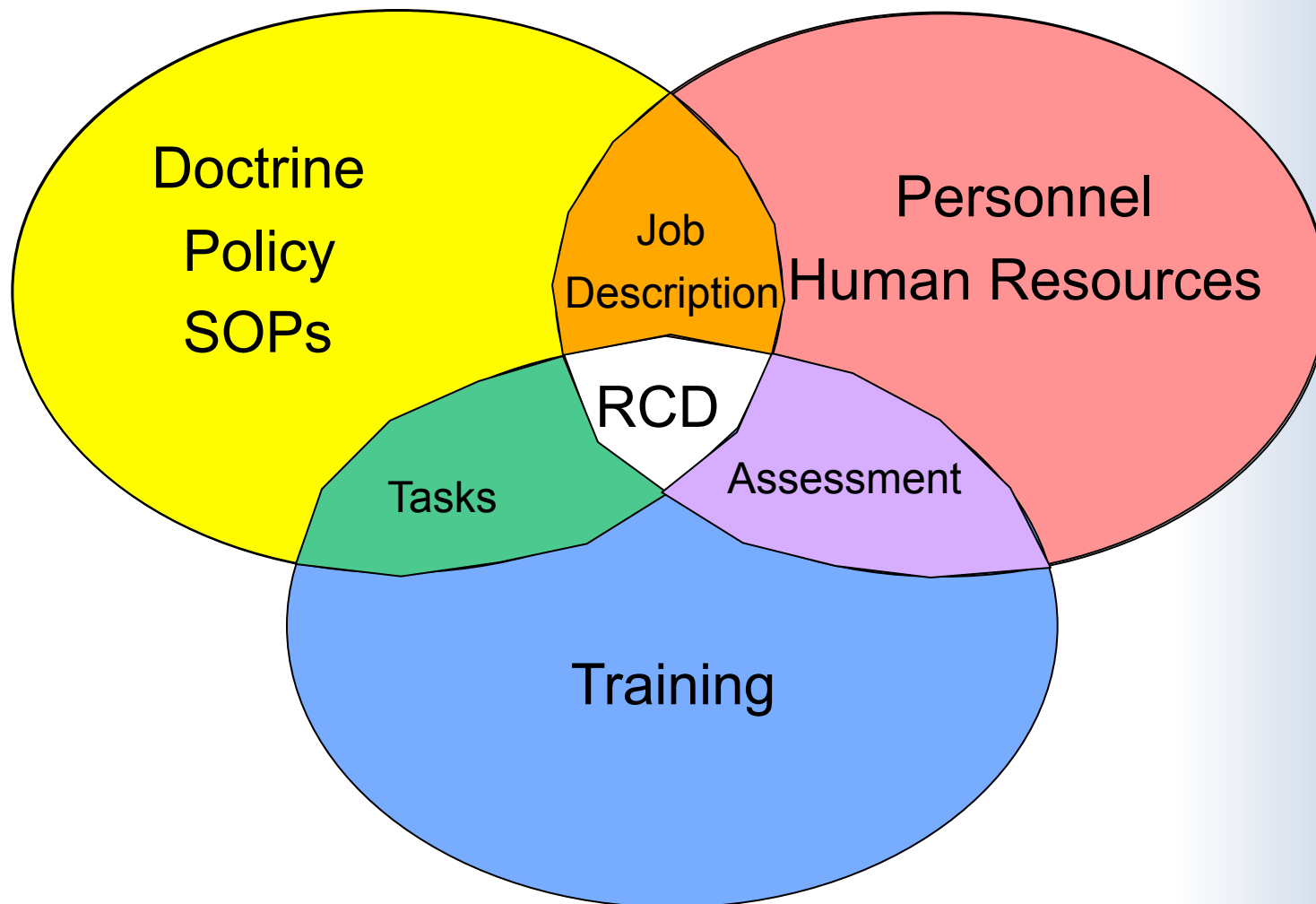


Reusable Competency Definition

- **Data about a competency**
- **“The part of competency data that can be reused for more than one person or group, in more than one context, possibly with different metrics”**
- **Can be very general or very specific**
- **Examples**
 - ◆ Negotiation – Bringing others together and trying to reconcile differences
 - ◆ Troubleshoot a Generic Data and Video Communications System (GDVCS): Given a GDVCS with a defective power supply and the GDVCS technical manual, verify and isolate the fault in less than 30 minutes



Reusable Competency Definitions in Different Contexts



RCDs in Different Contexts

■ Example of RCD

- ◆ Troubleshoot a Generic Data and Video Communications System (GDVCS)
 - Given a GDVCS with a defective power supply and the GDVCS technical manual
 - Verify and isolate the fault in less than 30 minutes
- ◆ Let us say that this RCD has an identifier: “rcd12345”

■ Use the same RCD in different contexts

- ◆ As a learning objective (objective = rcd12345)
- ◆ In metadata for training material (this is to teach rcd12345)
- ◆ In an assessment (is Jim proficient in rcd12345?)
- ◆ As part of a task (this task requires rcd12345)



Reusable Competency Definition Standards

- The IEEE Learning Standards Committee is developing a standard for RCDs
 - ◆ **IEEE Draft Standard P1484.20**
- This IEEE standard is based on the IMS Reusable Definition of Competency or Educational Objective Specification (RDCEO)
- The RCD data can be encoded as XML or stored into any relational database
- RCDs can be reused in various operations, e.g. competency building blocks that are collections of RCDs or that reference RCDs
 - ◆ **Lists**
 - ◆ **Hierarchies/Taxonomies**
 - ◆ **Ontologies**

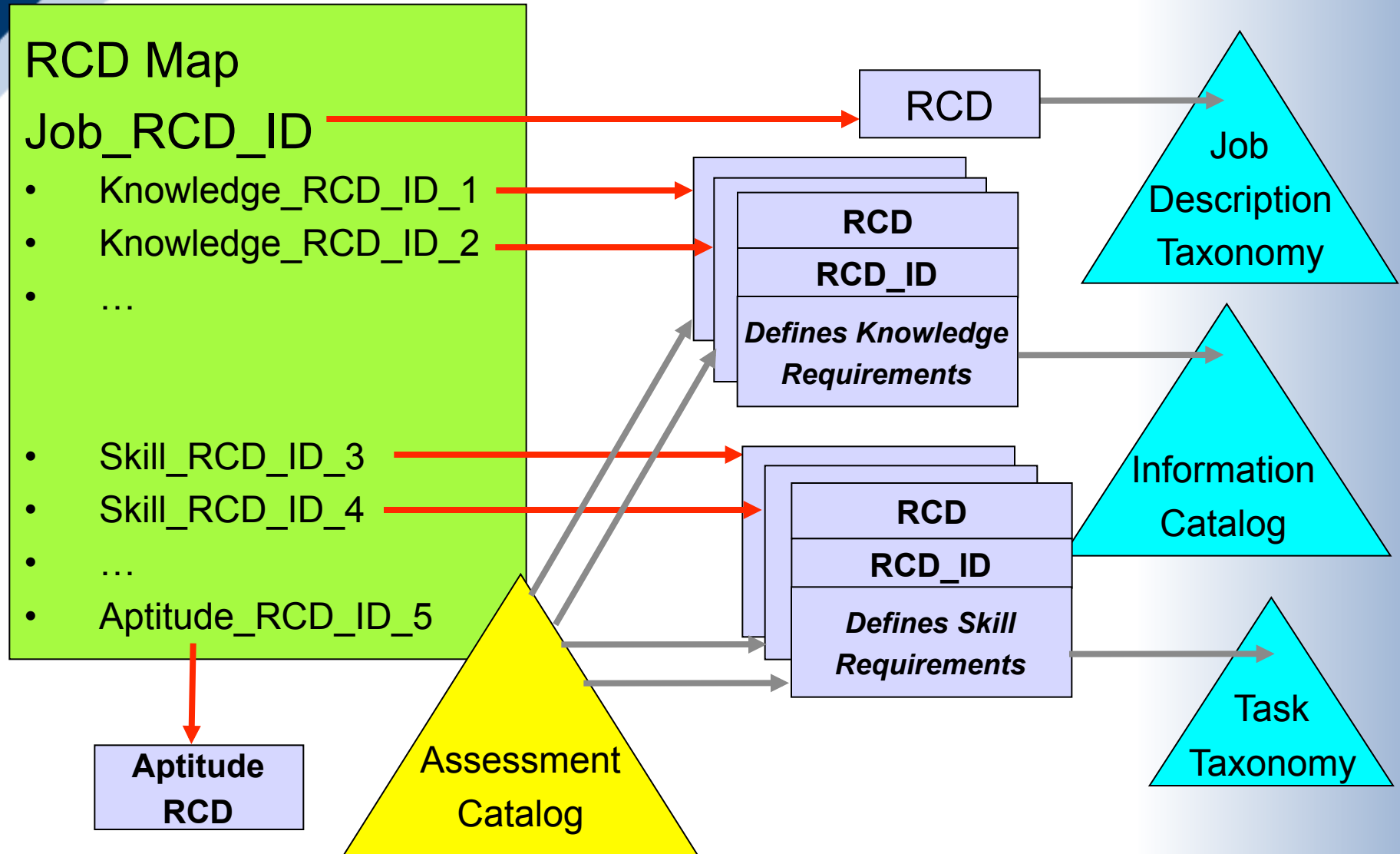


Why Standardize Competency Definitions?

- **Help standardize job descriptions**
 - ◆ Automate processing of personnel records
 - ◆ Support data exchange between personnel databases
- **Reduce the cost of personnel record-keeping**
- **A step towards automating the linkages between personnel record-keeping and training**
 - ◆ Make computer-based training more valuable to the organizations



RCDMAP and RDC Linkages

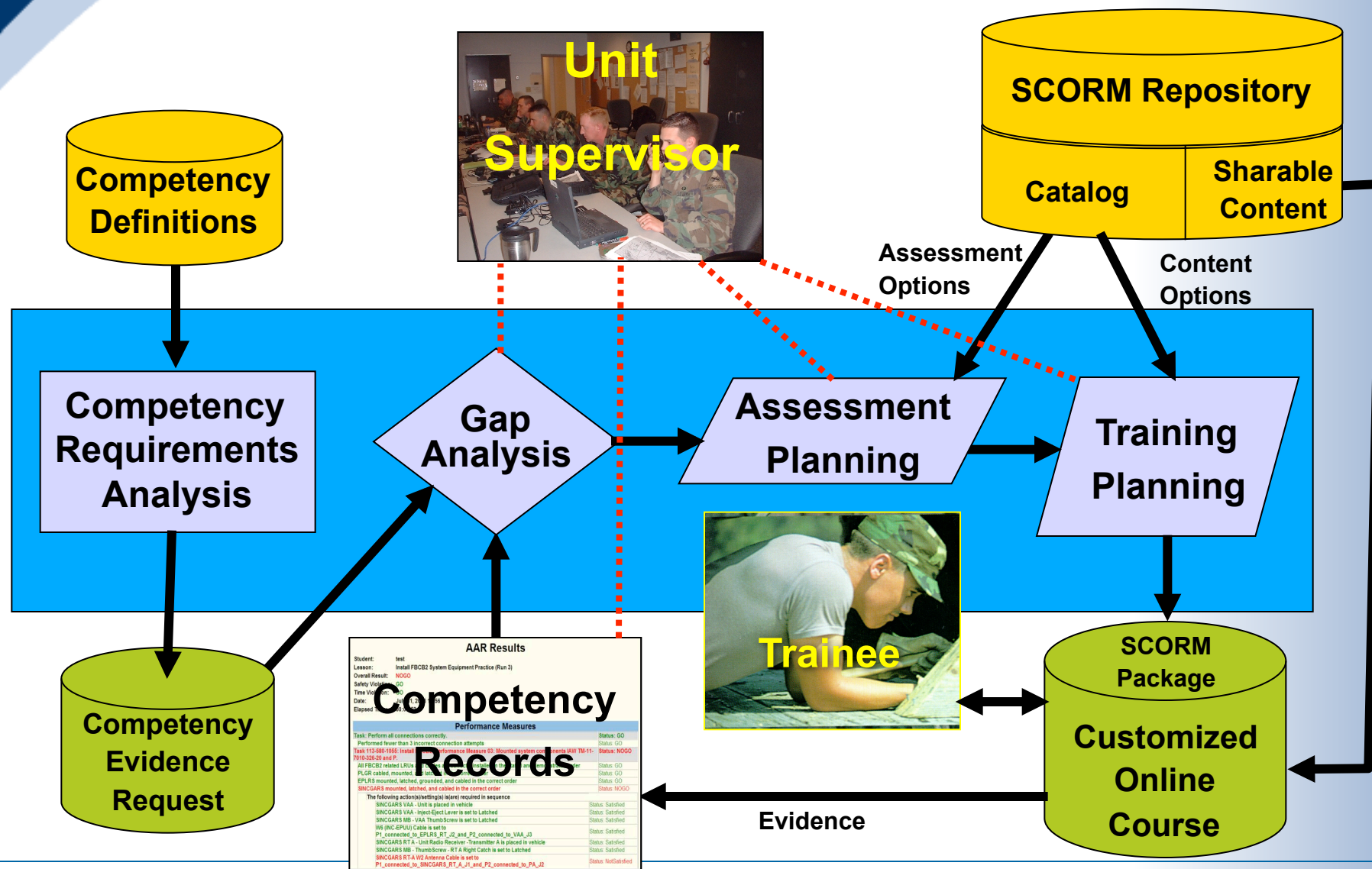


Why Digital Competency Definitions?

- **Lifelong Learning requires adaptable training**
 - ◆ Just-In-Time training for specific situations
 - ◆ Customized training based on the learner's experience
- **Digital competency definitions allow the computer:**
 - ◆ To help adapt the training in real time
 - ◆ To manage an audit trail



Adaptive Training



Some Acronym Definitions

- **MOS: Military Occupational Specialty**
 - ◆ MOS is like Civilian Profession/ Labor Category
- **SL: Skill Level**
 - ◆ Skill Level is like Salary Grade, not Proficiency
 - Different tasks/competencies required for different skill levels
 - Higher skill levels are required for advancement in rank
- **ASI: Additional Skill Identifier**
 - ◆ ASI indicates special skills beyond the base skills required for the MOS



Scenario

The Situation

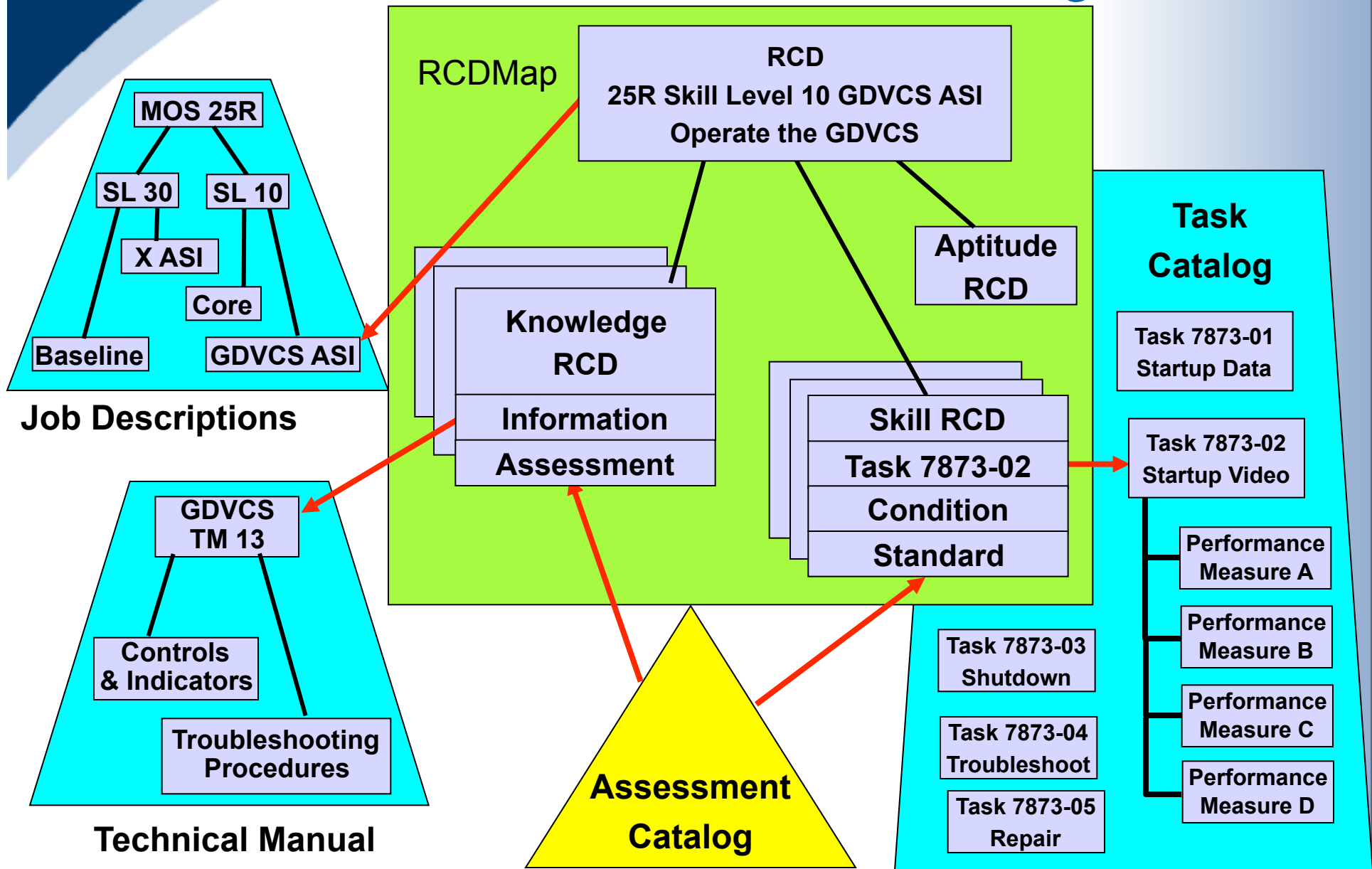
SFC George Smith is crew chief for the Network Operations Center of a Unit of Action. Last year, his unit got an upgrade of its Generic Digital and Video Communications System (GDVCS). However, all three of the soldiers who got the delta training for that upgrade have left the unit. Their new mission will include supporting Video Teleconferencing (VTC) with a remote unit that is also equipped with GDVCS.

PFC Johnny Jones is a 25R MOS (Radio Operator) with some experience with the GDVCS, but has never used it for video teleconferencing.

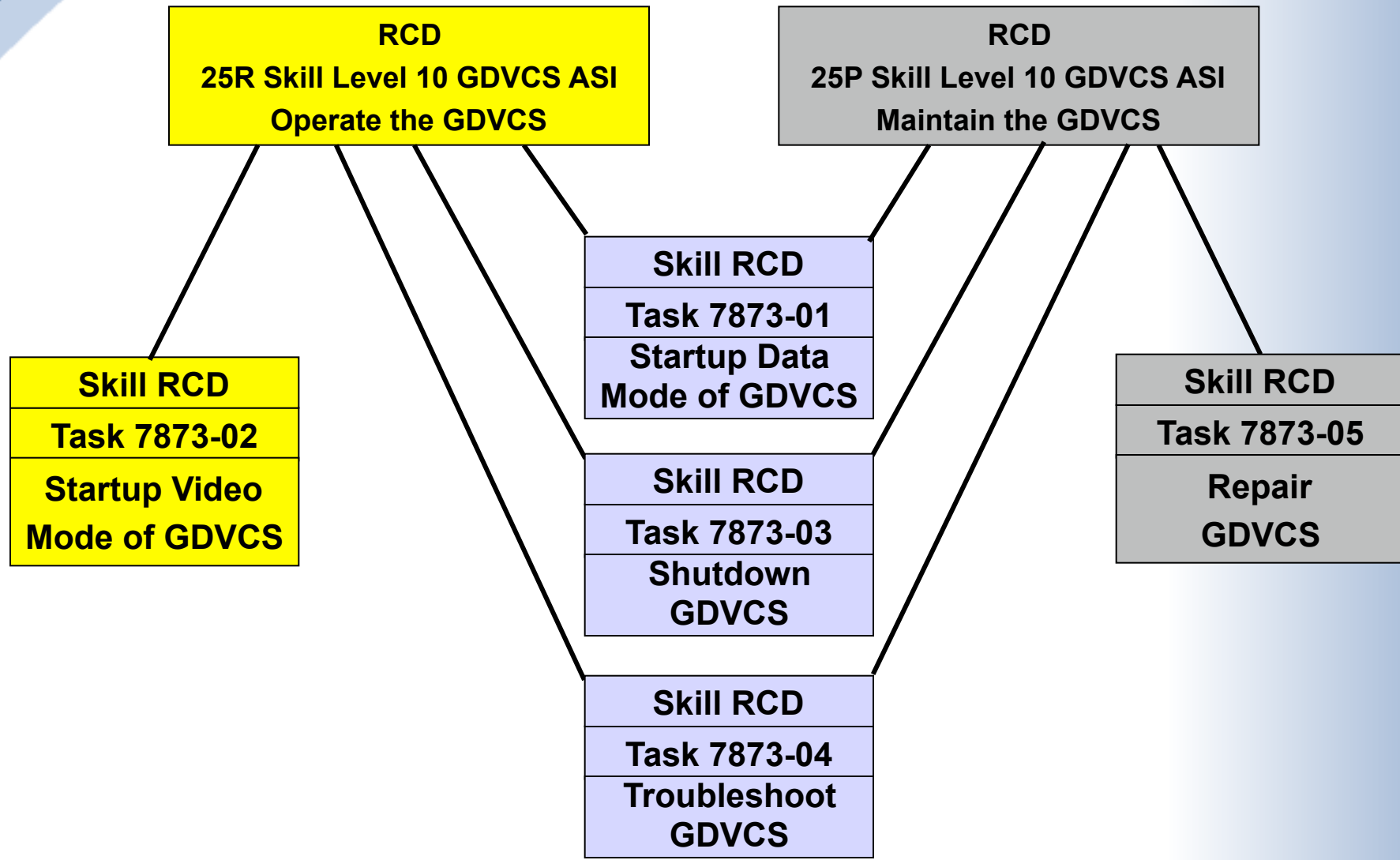
SSG Jose Rodriguez is a 25P (Radio Maintainer) with experience on an obsolete VTC system, but he has never worked with the GDVCS.



RCDMAP and RDC Linkages



Reuse of RDCs



Scenario

The Estimate

SFC Smith goes to the Lifelong Learning Center web portal and searches for a competency definition for operators and maintainers of GDVCS. He finds out that the 25R MOS and the 25P MOS both have an Additional Skill Identifier (ASI) for the GDVCS.



Operator Competency Request

- **MOS 25R Skill Level 10 Core Competencies**
 - ◆ Knowledge RCD: Basic Electronics
 - ◆ Knowledge RCD: Radio Safety
 - ◆ Skill RCD: Task 7870-01, Install Ground Cables
 - ◆ Skill RCD: Task 7870-02, Connecting Antenna Cables
- **MOS 25R Skill Level 10 GDVCS ASI**
 - ◆ Knowledge RCD: GDVCS Controls and Indicators
 - ◆ Knowledge RCD: Video Teleconferencing
 - ◆ Skill RCD: Task 7873-01, Startup GDVCS in Data Mode
 - ◆ Skill RCD: Task 7873-02, Startup GDVCS in Video Mode
 - ◆ Skill RCD: Task 7873-03, Shutdown GDVCS
 - ◆ Skill RCD: Task 7873-04, Troubleshoot GDVCS



Scenario

The Estimate (Continued)

SFC Smith runs a search of the competency records of his roster. He finds that none of his 25R or 25P soldiers have the GDVCS ASI, but finds out that PFC Jones is a 25R with experience on the GDVCS, and SSG Rodriguez is a 25P with VTC experience.



Gap Analysis

■ PFC Jones: MOS 25R

◆ MOS 25R Skill Level 10 Core Competencies

- | | |
|--|-----------|
| – Knowledge RCD: Basic Electronics | Satisfied |
| – Knowledge RCD: Radio Safety | Satisfied |
| – Skill RCD: Task 7870-01, Install Ground Cables | Satisfied |
| – Skill RCD: Task 7870-02, Connecting Antenna Cables | Satisfied |

◆ MOS 25R Skill Level 10 GDVCS ASI

- | | |
|--|---------------|
| – Knowledge RCD: GDVCS Controls and Indicators | Satisfied |
| – Knowledge RCD: Video Teleconferencing | Not Satisfied |
| – Skill RCD: Task 7873-01, Startup GDVCS in Data Mode | Satisfied |
| – Skill RCD: Task 7873-02, Startup GDVCS in Video Mode | Not Satisfied |
| – Skill RCD: Task 7873-03, Shutdown GDVCS | Satisfied |
| – Skill RCD: Task 7873-04, Troubleshoot GDVCS | Satisfied |



Scenario

25P Course of Action Analysis

SFC Smith decides to get PFC Jones and SSG Rodriguez qualified with the GDVCS ASIs before their rotation to the field with the new mission.

He accesses the 25P GDVCS ASI Assessment Plan Template at the web portal and runs a gap analysis comparing SSG Rodriguez Competency Records against the competency evidence requirements and finds two options:

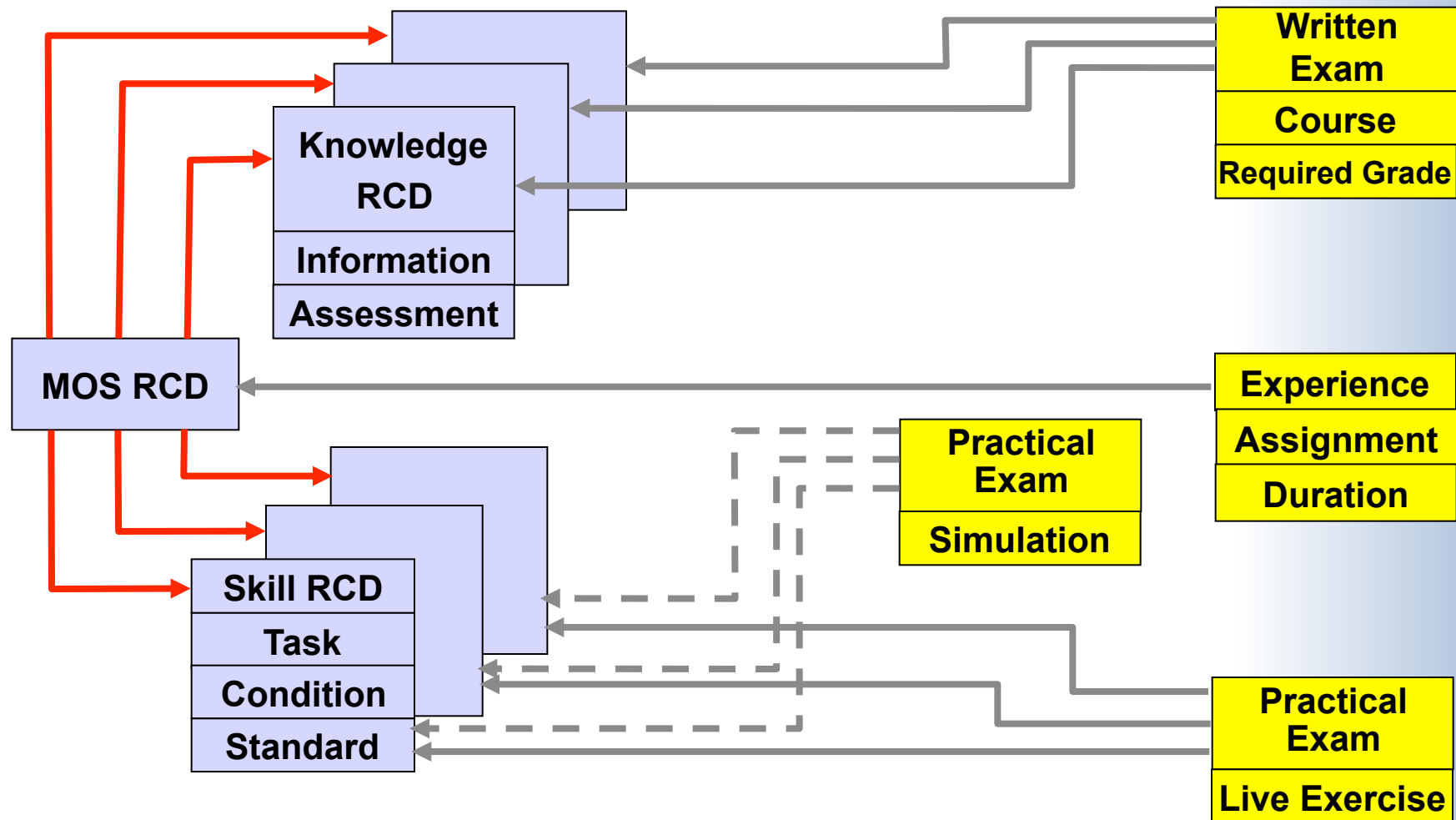
- 1. A satisfactory Competency Record for each of the four critical tasks of the ASI using the actual equipment with no Safety Violations**
- 2. A satisfactory Competency Record from successful completion of Signal Company training conducted at Ft. Gordon**

He decides to send SSG Rodriguez to Signal Company training rather than risk damaging his GDVCS radios, because he is down to a minimum of spares.



Linking Assessments to RCDs

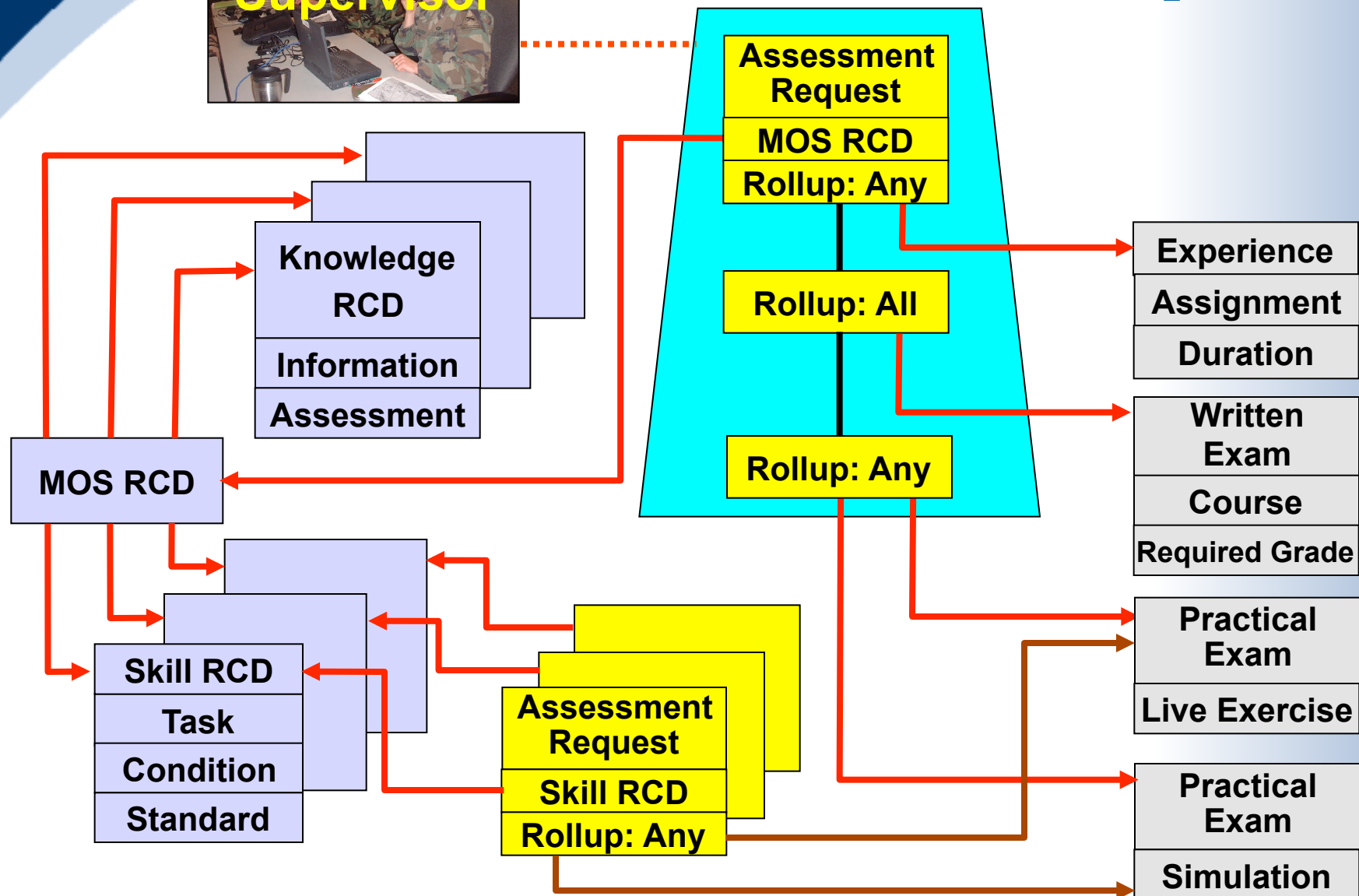
Why Assessment Requests



Unit Supervisor



Assessment Requests



Scenario

25R Course of Action Analysis

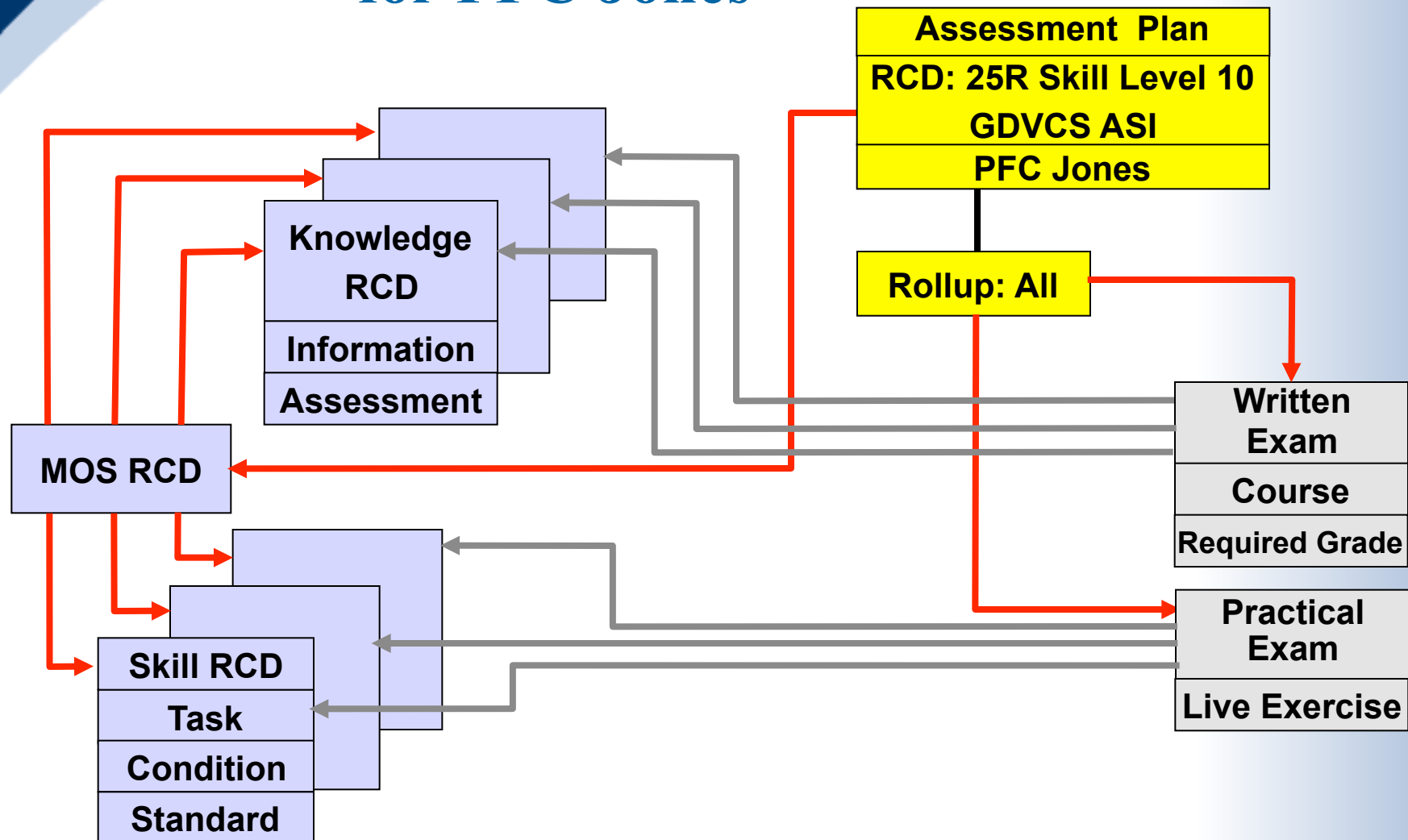
SFC Smith accesses the 25R GDVCS ASI Assessment Plan Template at the web portal and runs a gap analysis comparing PFC Jones Competency Records against the competency evidence requirements and finds two similar options:

1. **A satisfactory Competency Record for the Startup Video (7873-02) critical task of the ASI using the actual equipment with no Safety Violations. PFC Jone's previous experience provides satisfactory Competency Records for the other three critical tasks**
2. **A satisfactory Competency Record from Signal COHORT training conducted at Ft. Gordon**

Since PFC Jones has been working with the GDVCS and hasn't broken one yet, he decides to have PFC Jones qualify with a live training exercise.



An Assessment Plan for PFC Jones



Scenario

25R Course of Action Analysis (Continued)

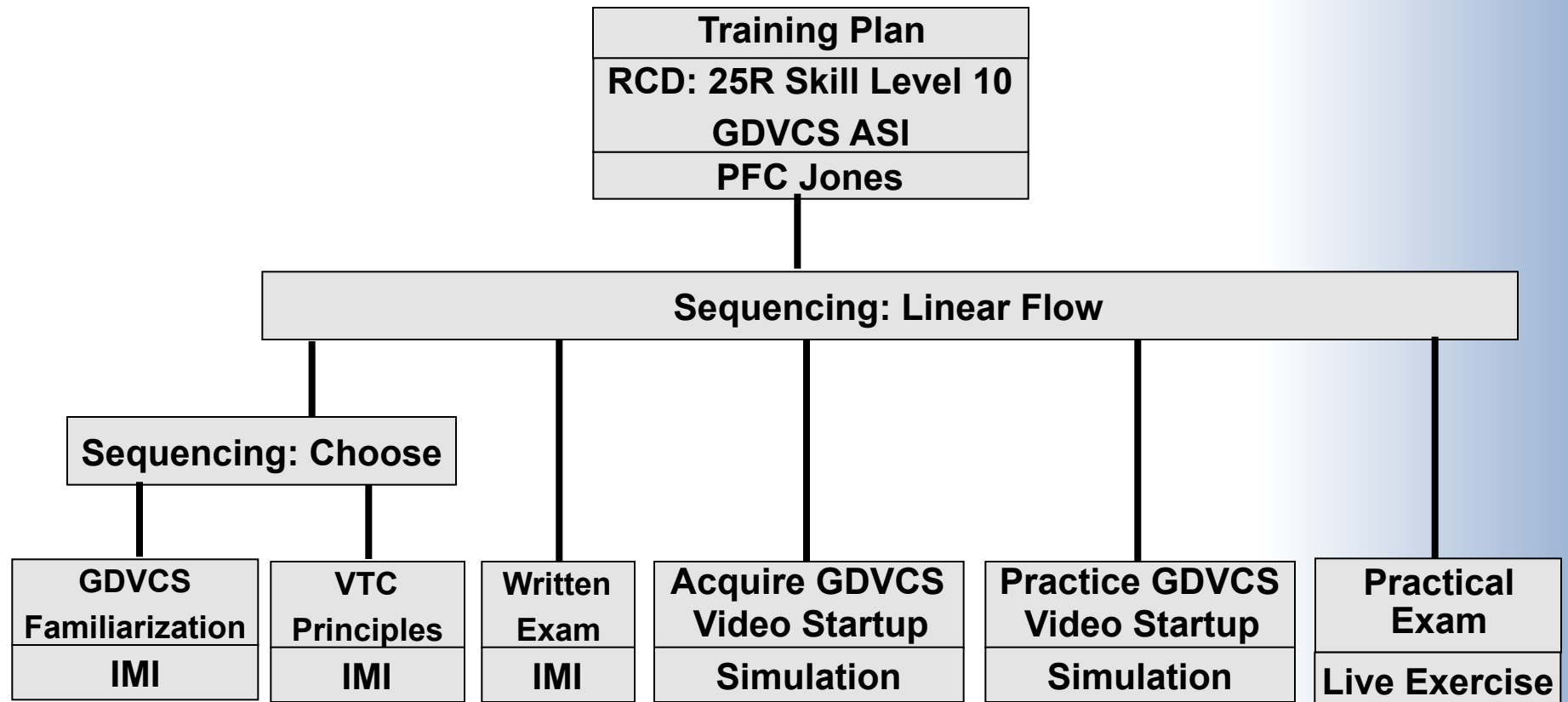
Now that SFC Smith has decided on an assessment plan, he interacts the web portal to build a training plan for PFC Jones. He wants PFC Jones to work through some distance learning materials before setting up the live certification exercise.

The training plan wizard at the web portal works backwards from the assessment requirements to design a course for PFC Jones, and comes back with the following recommendations:

- **A level 2 IMI lesson on VTC principles**
- **A level 3 IMI lesson on familiarization with the GDVCS**
- **A simulation lesson for acquiring the Startup Video Task skills**
- **A simulation lesson for practicing the Startup Video Task skills**
- **Practical exam on Startup Video Task skills using live GDVCS equipment**



A Training Plan for PFC Jones



Scenario

25P Course of Action Analysis (Continued)

SFC Smith also interacts the web portal to build a training plan for SSG Rodriguez . He wants SSG Rodriguez to work through some distance learning materials before going to Ft. Gordon, which will reduce his time away from the unit from 5 days to 3 days.

The training plan wizard at the web portal works backwards from the assessment requirements to design a course for SSG Rodriguez, and comes back with the following recommendations:

- **A level 3 IMI lesson on familiarization with the GDVCS**
- **Simulation lessons for acquiring the GDVCS Maintenance Task skills**
- **Simulation lessons for practicing the GDVCS Maintenance Task skills**

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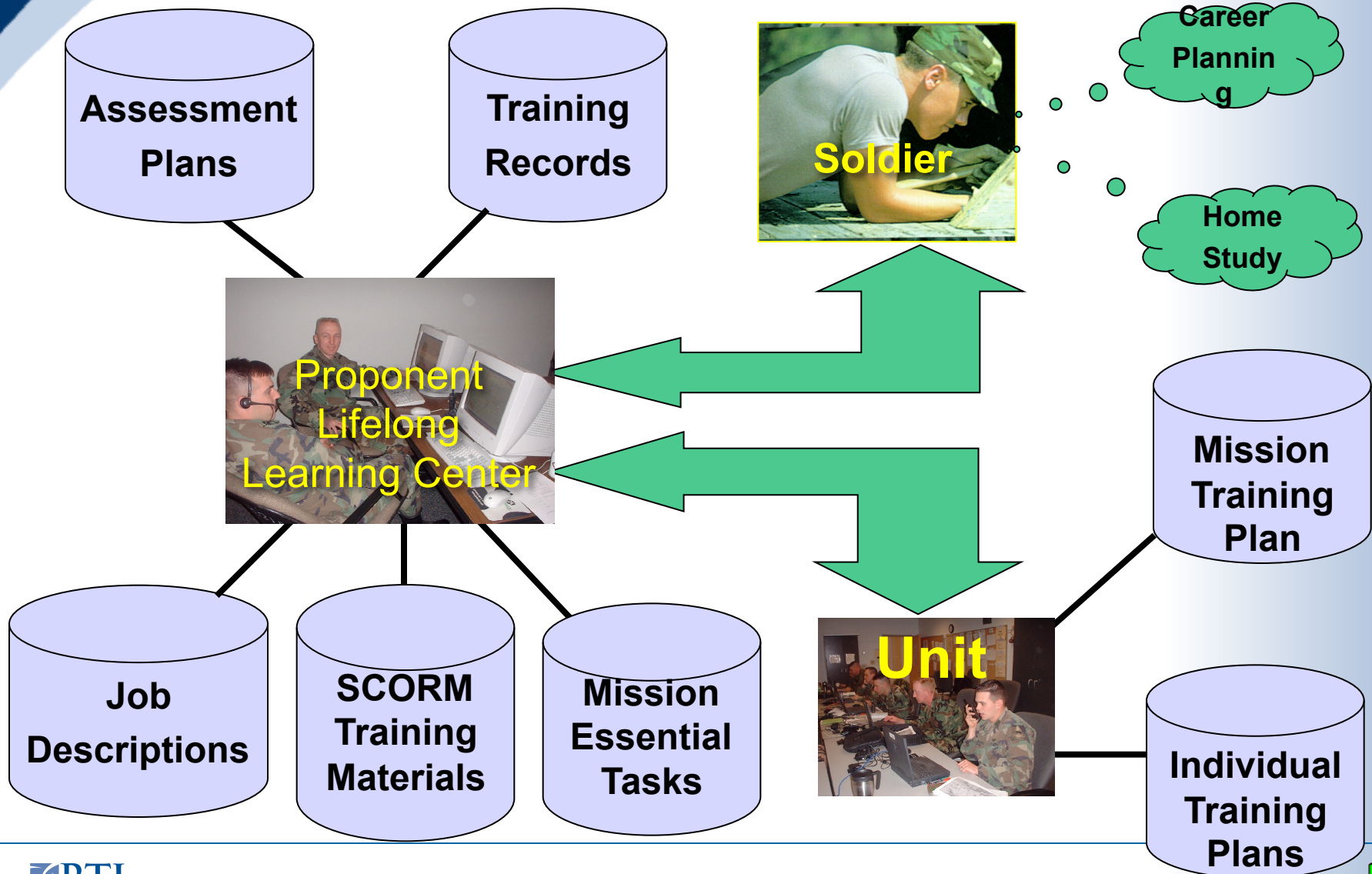


What is Being Done Now

- **SCORM**
- **Lifelong Learning Centers**
- **Assessment records produced by simulations**
- **Common live and virtual training assessment**



Lifelong Learning Centers



Automated After Action Reviews for Individual Training (Performance Measure Summary)

AAR Results	
Student:	JohnDoe
Lesson:	Video Mode Connect and Startup Practice Lesson
Status:	NOGO
Date:	Wednesday, November 19, 2003 at 10:25 AM
Elapsed Time:	00:01:58
Performance Measures	
Task7873-02, Video Mode Connect and Startup, Performance Measure a: VIPS and ASTM in Operational Video state	Status: GO
When USER presses DONE, the ASTM and VPIS must be powered ON and selection switches set to VIDEO	Status: GO
The following action(s)/setting(s) is(are) required	
VPIS Power Switch set to On	Status: Satisfied
VPIS Configuration Switch set to Video	Status: Satisfied
ASTM Power Switch set to On	Status: Satisfied
ASTM Configuration Switch set to Video	Status: Satisfied
Task7873-02, Video Mode Connect and Startup, Performance Measure b: Proper transmission frequency set	Status: GO
Task7873-02, Video Mode Connect and Startup, Performance Measure c: No Safety Violations committed	Status: NOGO
Task7873-02, Video Mode Connect and Startup, Performance Measure d: Less than 3 cable connection violations	Status: GO

■ What happened:

◆ Task and Performance Measures

■ Why events happened

◆ PM Criteria



Automated After Action Reviews for Individual Training (Student Log)

User Actions
User Performs Correct Action 'Vpis JTransmitter 1 Test Cap' State changed to 'Off'
User Performs Correct Action 'Vpis J3 Test Cap' State changed to 'Off'
User Performs Correct Action 'Cable W2' Location changed to 'InHand'
User Performs Incorrect Action Incorrect connection attempt between Plug P2 Connector J3 Connector
User Performs Correct Action 'Cable W2' State changed to 'P1_disconnected_and_P2_disconnected'
User Performs Correct Action 'Cable W2' Location changed to 'InPartsBin'
User Performs Correct Action 'Cable W2' Location changed to 'InHand'
User Performs Correct Action Correct alignment between Plug P1 Connector J3 Connector
User Performs Correct Action 'Cable W2' State changed to 'P1_connected_to_VPIS_J3_and_P2_disconnected_to_VPISTRANS_J1'
User Performs Correct Action 'Cable W2' Location changed to 'InUniverse'
User Performs Correct Action 'W2 Cable P2 Plug Vpis Trans' Location changed to 'InUniverse'
User Performs Correct Action 'W2 Cable P1 Plug Vpis Trans' Location changed to 'InUniverse'

■ How events happened

◆ Student actions

◆ Performance measure consequences

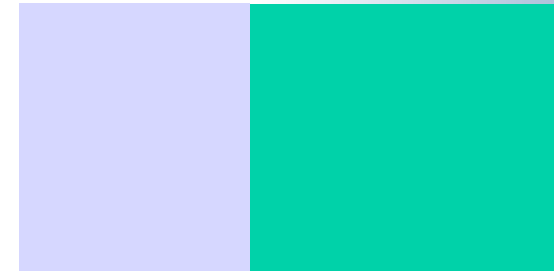
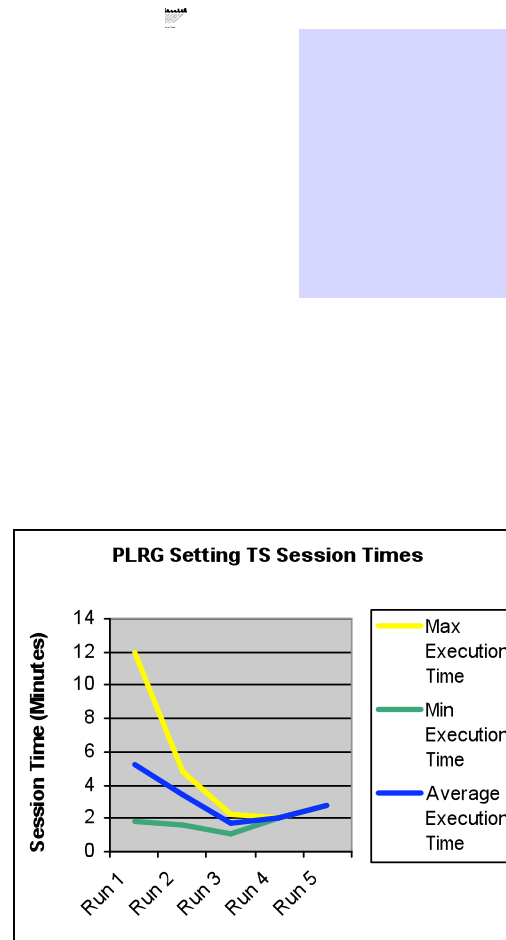


Reusable and Consistent Assessments for Live and Virtual Training



Analysis of Student Data

- LMS database provides information on student usage of simulation.
- Analysis of students actions to improve simulation training cost-effectiveness:
 - ◆ Measures of difficulty of lessons.
 - ◆ Usage of supporting lessons.
 - ◆ Lesson sequencing patterns.



Conclusions

- The IEEE and ISO are working on standardizing computerized competency definitions
- These standards are an opportunity for DoD and other organizations to leverage existing databases of tasks and job descriptions with commercially developed tools
- SCORM sequencing provides a powerful framework for:
 - ◆ Defining assessment requirements
 - ◆ Building customized courses from assessment requirements

